

THE ADVANCED CASTING RESEARCH CENTER – ACRC

Project Fact Sheet

BENEFITS

Method has been developed to quantitatively measure the actual contraction forces leading to hot tearing.

The developed method provides reliable and repeatable quantitative data to characterize hot tearing of Al alloys.

The data has helped improve castability of alloys that are challenging to cast; hot tearing in alloy 206 can be mitigated by improved process control.

The quantitative experimental data provide valuable input for hot tearing computational models.

The method can be used to characterize the solidification contraction behavior of alloys and differentiate them quantitatively.

IMPACT

Remove mysticism that is associated with hot tearing via quantitative measurements of alloy behavior during solidification.

A reliable tool used both for alloy development and as input for computational models.

Mitigate hot tearing during solidification.

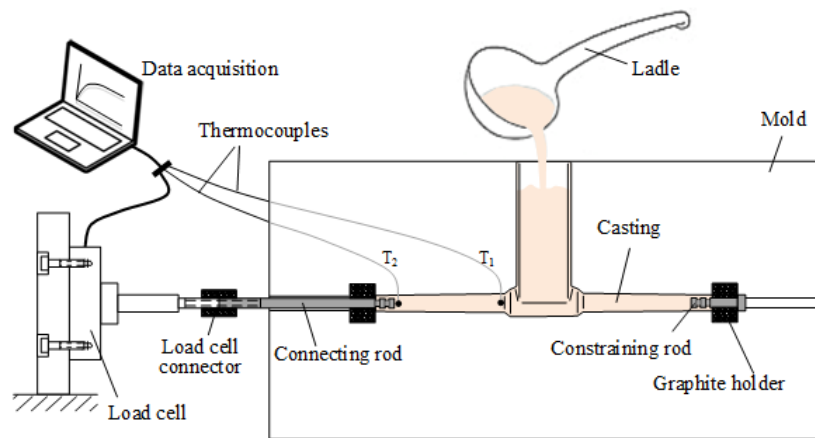
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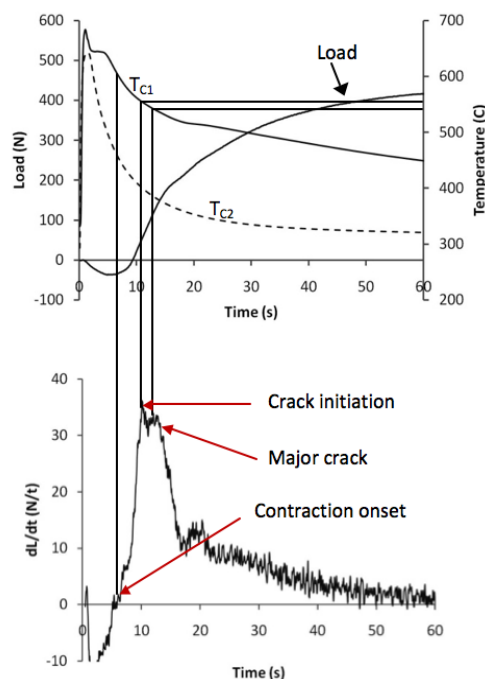
HOT TEARING IN ALUMINUM CAST ALLOYS: MEASURES AND EFFECT OF PROCESS VARIABLES

A reliable quantitative hot tearing test was developed. The effects of process variables including mold temperature, pouring temperature and grain refinement on hot tearing were investigated.

Experimental Set-up



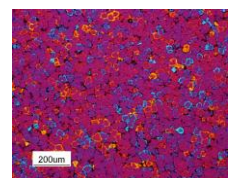
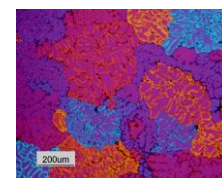
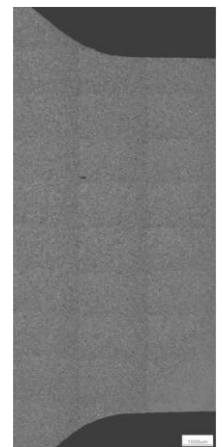
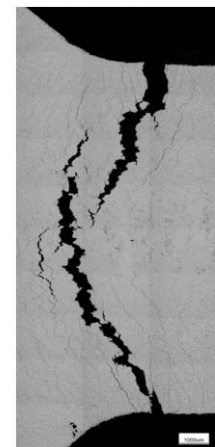
Load and Temperature Measurement



Effect of Grain Refinement (206)

Non grain-refined

Grain-refined



388 µm
Columnar+
Equiaxed

29 µm
Globular